

Technology Development for Future Spaceborne Remote Sensing Radars

Completed Technology Project (2015 - 2016)



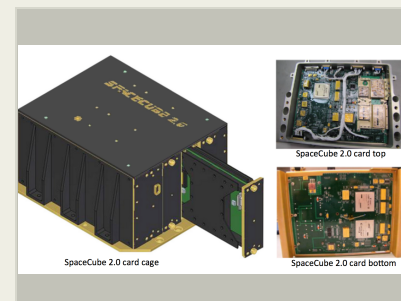
Project Introduction

This project will focus on the development of a high speed digital receiver/processor and a multi-channel radar transmit waveform/timing signal generator for future spaceborne remote sensing radars. The primary objective is to design and build the prototype cards based on the NASA GSFC SpceCube high speed processor by adding the high speed analog to digital (ADC) and digital to analog (DAC) functions. These devices will utilize Xilinx FPGAs to enable multi-channel remote sensing radar signal transmission and receive.

Space applicable FPGA-based high speed digital receiver/processor and versatile waveform generator are critical for future remote sensing radars. Although these types of devices have been widely used for ground-based and airborne radars, space applicable units are very rare and usually customized for specific missions, therefore these devices are expensive and difficult to integrated into a custom designed radar system. Additionally, modern radar technologies such as programmable cross-track scanning, pulse compression and frequency diversity require significantly more processing capabilities than previously flown radars. Over the past decade, NASA GSFC has developed and flown a Xilinx Virtex-5 based SpaceCube module on the ISS for high-speed data processing. In this project, we propose to extend this SpaceCube module with high-speed ADC and DAC functions to form a complete digital receiver/processor and a radar transmit waveform and timing signal generator. Given the fact that the current SpaceCube module is also suitable for radar system Command and Data Handling (C&DH) unit, the resulting boards through this effort will enable us to form a nearly complete system with a C&DH, I/O interface, digital receiver, and waveform generator that are necessary for the future spaborne remote sensing radars. In addition, This new extended SpaceCube system will be fully programmable and versatile for different spaceborne sensors, such as a multi-channel imaging radiometer, and surface imaging SAR.

Anticipated Benefits

N/A



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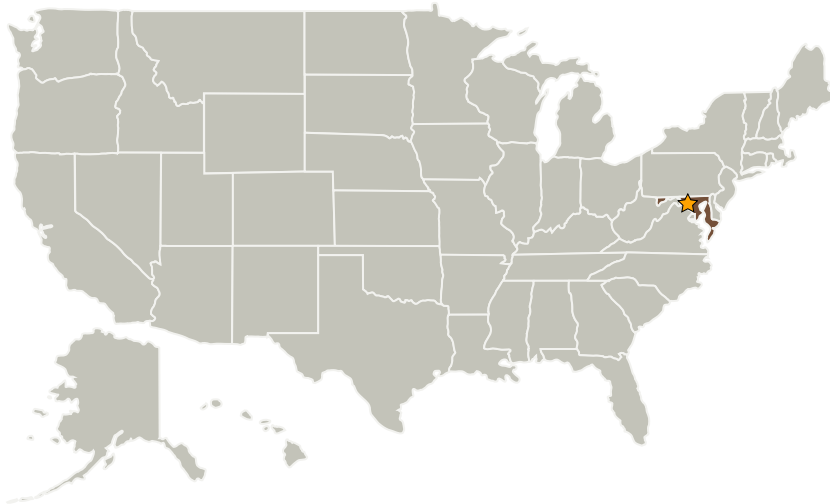
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Primary U.S. Work Locations and Key Partners



Organizations Performing Work	Role	Type	Location
★ Goddard Space Flight Center (GSFC)	Lead Organization	NASA Center	Greenbelt, Maryland

Primary U.S. Work Locations

Maryland

Organizational Responsibility

Responsible Mission Directorate:

Mission Support Directorate (MSD)

Lead Center / Facility:

Goddard Space Flight Center (GSFC)

Responsible Program:

Center Independent Research & Development: GSFC IRAD

Project Management

Program Manager:

Peter M Hughes

Project Managers:

Terence A Doiron
Matt McGill

Principal Investigator:

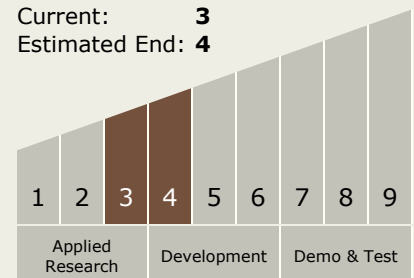
Lihua Li

Technology Maturity (TRL)

Start: 3

Current: 3

Estimated End: 4

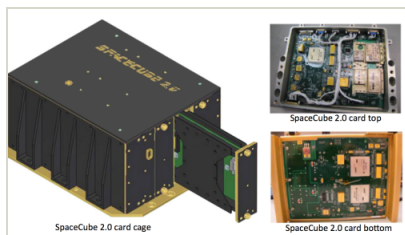


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Images



Technology Development for Future Spaceborne Remote Sensing Radars Project titled

Technology Development for Future Spaceborne Remote Sensing Radars Project
(<https://techport.nasa.gov/image/19262>)

Project Website:

<http://aetd.gsfc.nasa.gov/>

Technology Areas

Primary:

- TX08 Sensors and Instruments
 - └ TX08.1 Remote Sensing Instruments/Sensors
 - └ TX08.1.4 Microwave, Millimeter-, and Submillimeter-Waves